REMARKS

The withdrawal of all prior grounds of rejection is appreciatively noted.

The new rejections of claims 1-4 and 6-10 under 35 U.S.C. §102 as allegedly anticipated by Meaney et al '987 or in the alternative, made "obvious" based on a combination of Meaney et al '987 and Kaufman '252 are both respectfully traversed.

Applicant's independent claim 1 requires, inter alia, generating 3-dimensional position information for the patient's region of interest (e.g., via quick images that are taken after the patient is on the couch and approximately in position, e.g., see dependent claim 2). Claim 1 further requires that the patient couch be controlled in three dimensions based on that provided position information such that the region of interest is repositioned in three dimensions substantially either at the center of the static magnetic field or at the center of the gradient magnetic field -- center positions which are fixed predetermined geometric locations within the imaging gantry.

Independent claim 6 requires reconstructing plural patient images when the patient is first disposed at an approximate desired location, selecting one of those images that includes the region of interest and then moving the patient couch, based on that selected image, so that the patient's region of interest substantially coincides in three dimensions with the center of the static magnetic field or the center of gradient magnetic field.

Independent claim 8 requires that the patient region of interest be designated in three dimensions and that the patient couch then be moved in three dimensions so that the patient's region of interest substantially coincides three dimensionally with the center of the static magnetic field or the center of the gradient magnetic field. Dependent claim 9 requires an initial approximate positioning followed by initial position-determining imaging, selection of an image from among those so generated and designation of the region of the interest within the selected image, etc.

Simply stated, Meaney is irrelevant to such claims.

Based on the Examiner's comments, it appears that some of the clear error involved in this ground of rejection is based on a mis-apprehension that the center of k-space corresponds to the center of the static magnetic field or the center of the gradient magnetic field. This is simply not the case. As will be explained in more detail below, the center of k-space simply corresponds to lower spatial frequencies of the image data -- regardless of what position within the image is at issue.

"k-space" refers to a virtual space in which raw acquired data before reconstruction are arranged and does not directly correspond to any actual geometrical position in the patient or imaging system. The data arranged in k-space are subsequently two-dimensionally (or three-dimensionally) Fourier transformed, to produce an image. In an MRI imaging sequence, image data re repeatedly obtained with changing amounts of phase encoding magnetic gradient. The data obtained when the phase encoding gradient

is of zero value corresponds to the center of k-space. Consequently, the discussion of the center of k-space in Meaney does not refer to any geometrical real space position. Rather, Meaney adjusts the initiation timing of an MRI sequence so that data at the center of k-space (where the lowest spatial frequencies have a relatively large offset throughout the entire image) is obtained at a point in time when the concentration of contrast agent in the image volume is high. Meaney does not have any meaningful relation to the claimed invention at all.

The Examiner's reference to "any data which occurs at any magnetically constructively interfering location" makes no sense to the undersigned or to the applicant. Further explanation is requested if this ground of rejection is to be maintained.

Meaney et al simply does not disclose any technique to force the center of the static or gradient magnetic field to coincide in three dimensions with a patient region of interest.

If, as the Examiner alleges, Meaney et al teaches and suggests an MRI system (method and apparatus) designed for "moving the patient couch based on a signal from a position detector so that a region of interest of the patient precisely coincides with the center of the magnetic field", then at minimum the system must be provided with a couch-actuating mechanism for moving the couch not only horizontally but vertically so as to allow the center of magnetic field to coincide with various patient regions of interest

in three dimensions. Patients have a variety of regions of interest whose heights are different from each other.

However, Meaney et al does not teach or suggest any mechanism for moving the couch vertically. In fact, Meaney et al simply disclose a technique and system for imaging vascular anatomy of the patient over a distance greater than the maximum practical field of view of an MRI system. The patient on the platform is moved in the horizontal direction for the purpose of increasing the image area with one injection of contrast agent. There is no disclosed concept that the patient region of interest should coincide with the center of the static (or gradient) magnetic field.

The Examiner's citation of Kaufman is similarly inappropriate. While Kaufman, like many prior art teachings, certainly does teach that the gradient magnetic field is superimposed on the static magnetic field, etc., and may also have a moveable patient couch transport structure, neither Kaufman nor Meaney nor any possible combination thereof in any way teaches or suggests that a patient region of interest position should be determined and then moved into precise three-dimensional alignment with the center of the static magnetic field or the gradient magnetic field.

While there are numerous other errors throughout the Examiner's comments in support of this ground of rejection, it is not believed necessary at this time to further address them.

The rejections of claim 5 under 35 U.S.C. §102 as allegedly anticipated by Meaney '987 or, alternatively, as allegedly made "obvious" based on the combination of Meaney '987, Kaufman '252 and Takekoshi '208 are also respectfully traversed.

The fundamental deficiencies of Meaney and Kaufman have already been discussed above with respect to parent claim 1.

Though Takekoshi mentions vertical and horizontal movement of the patient platform, as described in column 6, lines 13 to 14, its description is no more than that it is preferred to position the region of interest at the magnetic center. Further, as described in column 7, lines 63 to 67, the couch can move only under the upper surface of the lower magnet 40 (namely, under the imaging space) to make it easier for the patient to get on or off the couch. Consequently, Takekoshi fails to disclose or suggest that the region of interest of the patient is made to coincide with the center of the magnetic field three-dimensionally as described in the present invention.

The rejections of claims 11 and 12 under 35 U.S.C. §102 as allegedly anticipated by Meaney '987 or, in the alternative, under 35 U.S.C. §103 as allegedly being made "obvious" based on the three-way combination of Meaney '987, Kaufman '252 and Acker '522 are also respectfully traversed.

Independent method claim 11 is specifically directed to three-dimensional positioning of a patient region of interest substantially at an optimum MR imaging

position. That method requires first positioning the patient region of interest within an MRI field of view, then generating MR images in three dimensions while located at that first position, then locating and designating the patent region of interest within those images. Claim 11 further requires generation of three-dimensional position difference data between the designated position of the patient's region of interest in the selected image and the optimum MR imaging position of the system -- followed by repositioning the patient region of interest in three-dimensions from the first now designated position to the optimum MR imaging position using the position difference data.

The fundamental deficiencies of the primary and secondary references with respect to such features have already been noted above. Acker does not supply those deficiencies.

Acker is simply directed to a conventional MRI system utilized to monitor ongoing patient therapies in real time. While it does provide three dimensional imaging and the ability for a manual operator to use a joy stick and reposition the monitored anatomy as desired, e.g., so that it is "centered in the field of view" (column 16, line 24), this still fails to teach or suggest the methodology of claim 11. For example, claim 11 (as above amended) requires the generation of three-dimensional position difference data between a designated position of the patient region of interest (located using a first quick scan MRI process) and an optimum MR imaging position followed by automatically repositioning in three dimensions using said position difference data -- followed by more

time consuming diagnostic MRI when at the optimum position. At best, it appears that Acker merely permits the operator to manually reposition the patient arbitrarily within the MRI system field of view -- while the MRI system continues to use the same monitoring MRI data acquisition sequence.

Accordingly, this entire application is still believed to be in allowable condition and a formal Notice to that effect is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page(s) is captioned "**Version With Markings To Show Changes Made**."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

11. (Amended) A method for three-dimensionally positioning a patient region of interest substantially as an optimum MR imaging position for diagnostic imaging within an MRI system, said method comprising:

positioning a patient region of interest at a first position within an MRI field of view;

generating MR images of the patient in three dimensions while located at said first position using a first high speed positioning scan MRI data acquisition pulse sequence;

locating and designating the patient region of interest position within said images;

generating 3-dimensional position difference data between the designated position of the patient region of interest in the images and an optimum MR imaging position; [and]

automatically re-positioning the patient region of interest in 3-dimensions from said first, now designated, position to an optimum MR imaging position using said position difference data; and

generating diagnostic MRI data, after the patient is re-positioned to said optimum MR imaging position, using a second diagnostic MRI data acquisition pulse sequence, different than said first sequence, to provide diagnostic images having improved precision and quality with reduced image distortion, non-uniformities and fat artifacts.